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### **INTERVIEW REQUEST**

An interview with the Examiner regarding this case is requested. The Examiner may reach Applicants' attorney at the telephone number or email address listed below.

### **AMENDMENTS**

Applicants respectfully request that the pending claims be amended, added to, or cancelled to eventuate in the set of claims set forth below. Pursuant to 37 C.F.R. §§ 1.121 (b) and (c), amendments to the claims pending in this case are shown below in "unmarked form" and at Appendix A hereto in "marked form."

#### **In the Claims:**

❖ **General Statement with Regard to Amendments, Cancellations and Additions to Claims**

Amendments to, cancellation of, and additions to, the claims, as set forth below, are made in order to streamline prosecution in this case by limiting examination and argument to certain embodiments of the invention that presently are considered to be of immediate commercial significance. Amendment or cancellation of the claims is not in any manner intended to, and should not be construed to, waive Applicants' right in the future to seek such unamended or cancelled subject matter, or similar matter (whether in equivalent, broader or narrower form) in the present application, and any continuation, divisional, continuation-in-part, RCE, CPA or any other application claiming priority to or through the present application, nor in any manner to indicate an intention, expressed or implied, to surrender any equivalent to the claims as pending after such amendments or cancellations.

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❖ Cancellation of Claims

- Claims 32 - 42 are cancelled herein in light of the provisional election made herein with traverse.
- Claim 21 is cancelled herein.

❖ Amendment of Claims

- Claims 1, 21 and 23 - 31 are amended herein.

❖ New Claims Added

- Claims 43 - 45 are added herein.

**UNMARKED CLAIMS AS PENDING AFTER INCORPORATION OF  
AMENDMENTS, CANCELLATIONS, AND ADDITIONS MADE HEREIN**

1. (Twice Amended) A non-catalytic process for the conversion of a hydrocarbon load containing residues or heavy distillates into lighter liquid products that may be distilled, the process comprising the steps of:

preheating said hydrocarbon load to a first temperature, wherein the load comprises one or more hydrocarbons selected from the group consisting of residues and heavy distillates;

injecting said hydrocarbon load into a reactor, wherein the reactor is operated at a second temperature, wherein the second temperature is less than about 520 °C and about 20°C - 25°C greater than the first temperature, and wherein the temperature of the reactor in conjunction with the conditions within the reactor is insufficient to thermally crack the load;

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mechanically shearing the molecules of the load with a jet to produce hydrocarbons comprising liquid hydrocarbons, said jet having a temperature insufficient to thermally crack said hydrocarbon load and operatively associated with said load so as to input mechanical energy into said load.

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claim was cancelled  
21-25  
21. (Once Amended) A process for the conversion of a hydrocarbon load containing residues or heavy distillates comprising hydrocarbon molecules into lighter liquid products that are substantially free of soot, coke and gases, the process comprising:

preheating a hydrocarbon load to a temperature that is below a temperature necessary to thermally crack the hydrocarbon load under the conditions such hydrocarbon load is subjected;

intimately contacting the load with a high-speed jet having a temperature that is insufficient under the conditions of the contact to thermally crack said hydrocarbon molecules in said load, said high-speed jet having a speed and expansion rate that imparts sufficient mechanical energy to the hydrocarbon molecules of the hydrocarbon load to cause the molecules to split;

injecting the hydrocarbon load into a reactor, wherein said reactor is operated at a second temperature which is less than a cracking temperature of the load under the conditions within said reactor;

obtaining liquid hydrocarbons from said reactor.

22. (Cancelled)

23. (Once Amended) The process of claim 23, further comprising saturating the split molecules of the load in a soaking chamber.

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24. **(Once Amended)** The process of claim 24, wherein saturating the split molecules of the load comprises utilizing steam for the jet, wherein the sheared molecules of the load are allowed to soak in the steam.

25. **(Once Amended)** The process of claim 23, wherein the jet comprises steam.

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26. **(Once Amended)** The process of claim 23, wherein the jet has a velocity of about 700 m/s.

27. **(Once Amended)** The process of claim 23, wherein the jet is preheated to a temperature at which no substantial thermal conversion of the load occurs.

28. **(Once Amended)** The process of claim 23, wherein the load is not vaporized prior to introduction into the path of the jet.

29. **(Once Amended)** The process of claim 23, wherein the load is introduced into the path of the jet in said reactor.

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30. **(Once Amended)** The process of claim 23, wherein the temperature of the reactor is about 540°C.

31. **(Once Amended)** The process of claim 23 wherein the temperature of the jet is about 25°C greater than the temperature of the reactor.

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32. **(Cancelled)**

33. **(Cancelled)**

34. **(Cancelled)**

35. **(Cancelled)**

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36. (Cancelled)

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

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43. (New) A process for converting a hydrocarbon load comprising a plurality of hydrocarbon molecules, the process comprising the steps of:

- (a) heating said hydrocarbon load to a temperature that fails to provide enough thermal energy to crack said hydrocarbon molecules in said hydrocarbon load;
- (b) inputting mechanical energy into said heated hydrocarbon load sufficient to cause shearing of said hydrocarbon molecules in said hydrocarbon load.


44. (New) A process for converting a hydrocarbon load comprising a plurality of hydrocarbon molecules, said hydrocarbon load requiring an enthalpy variation value of E for cracking of the hydrocarbon molecules contained in the hydrocarbon load, the process comprising the steps of:

- (a) heating said hydrocarbon load to a temperature producing an enthalpy variation of  $E - X$ , wherein X is not zero or negative;

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- (b) adiabatically inputting mechanical energy into the heated hydrocarbon load to produce an enthalpy variation value of  $\geq X$  to obtain shearing of said hydrocarbon molecules in said hydrocarbon load.

45. (New) A process for the conversion, without the use of a catalyst, of a hydrocarbon load containing residue and heavy distillates comprising hydrocarbon molecules into lighter liquid products that may be distilled, the process comprising the steps of:

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- (a) preheating said hydrocarbon load to a first temperature that is below a temperature necessary to thermally crack the hydrocarbon load under the conditions such hydrocarbon load is subjected;
- (b) injecting into said preheated hydrocarbon load a jet of heated gas or steam to form a load/jet mixture, said load/jet mixture being at a temperature that in itself is insufficient to thermally crack the hydrocarbon load under the conditions such hydrocarbon load is subjected;
- (c) injecting the load/jet mixture through an injector into a reactor operated at a second temperature that is below a temperature necessary to thermally crack the hydrocarbon load under the conditions within said reactor;

wherein said injector adiabatically relieves the load/jet mixture to an extent such that said load within the reactor attains sufficient mechanical energy to shear said hydrocarbon molecules in said load to produce distillable lighter liquid products.

46. (New) The process of claim 45 wherein the process produces substantially no gaseous hydrocarbons, coke or soot.

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47. (New) The process of claim 45 wherein the jet of step (b) comprises steam.

48. (New) The process of claim 47 wherein the process produces a stable water-hydrocarbon emulsion.

49. (New) The process of claim 48 wherein the water-hydrocarbon emulsion is stable for periods of two or more months when the emulsion is unagitated.

50. (New) The process of claim 49 wherein the water-hydrocarbon emulsion is stable for more than one year when the emulsion is unagitated.

51. (New) The process of claim 45 wherein the jet of step (b) comprises CO<sub>2</sub>.

52. (New) The process of claim 45 wherein substantially all of the hydrocarbon molecules of the load are broken into two parts.

53. (New) The process of claim 45 wherein the jet of step (b) comprises one or more gases selected from the group consisting of: H<sub>2</sub>O, CO<sub>2</sub>, CO, H<sub>2</sub> and N<sub>2</sub>.

54. (New) The process of claim 45 wherein the injection of the load/jet mixture into the reactor of step (c) is configured such that the load/jet mixture does not have substantial contact with the walls of the reactor.

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